

Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

H.M.S. "Furious." ABSTRACT of DISTANCES accomplished Daily between Han-kow and Woo-sung, on the Yang-tze-kiang.

Date.	Place.		Distance	
	Left.	Arrived at.	Run.	From Han-kow
1858.				
Dec.12	Han-kow	Northward of the Hwang-chow Shoals	53	53
13	Hwang-chow Shoals	Woo-chang-hsien	11	64
14		er to the Channel	5	69
15	Red-sand Rock Point	Lime-quarries below Hwang-shih-kang	19	88
16	Lime-quarries below Hwang-shih-kang	Woot-seih	48	136
17, 18	Looking fo	r Channel		136
19	Attempted t	o cross the bar	11	1371
20	Crossed the bar	Kew-kiang	23	160
21 to	Off Kew-		••	1603
Jan. 2, 1859.				1
1859.				
Jan. 3	Kew-kiang	8 miles above the "Poyang Lake"	12	1723
4	8 miles above the "Po- yang Lake"	5 miles below Sea- ou-kou-shan (Lit- tle Orphan Rock)	36	208 1
5	5 miles below Sea-ou- kou-shan	Lan-keang-kee	73	2811
6	Lan-keang-kee	Kew-hien	84	365 1
7	Kew-hien	8 miles above Nankin	78	443
8	8 miles above Nankin	5 miles below Kiang- vin	115	558 1
9	5 miles below Kiang-yin	Bush Island	60	618
10	Bush Island	Wusung	5	$623\frac{1}{2}$

VI.—Ascent of the Yang-tze-Kiang. By WILLIAM BLACKNEY, R.N.

Communicated by Captain Byron Drury, R.N., F.R.G.S.

Read, March 28, 1859.

H.M.S. Actaon, Shanghae, Jan. 10, 1859.

By the last mail (7th January) I sent you a postscript of the 'North China Herald,' with an account of Lord Elgin's Expedition up the Yang-tze-Kiang. I had not time to write a letter with it, but I trust you may find this which I write now readable—the paper, however, is the best general account.

You will no doubt be surprised to hear of the Action being still at Shanghae, arrhor I wrote in October we wromen the very of sciling for the North.

as when I wrote in October we were on the eve of sailing for the North. The

Yang-tze cruise had only just then begun to be talked of, and luckily for us Lord Elgin decided on going a day or two before the time fixed for our leaving, and so the northern cruise was abandoned for one of much more interest and importance. The Acteon was left at Wusung, Hooper, Kerr, Ellis, and Farmer remaining to survey the river to Shanghae, and Captain Ward and

myself in the Dove detached for service in the Yang-tze.

Dove left Wusung on the 6th November, two days before the rest of the squadron, to examine the channel south of the Blonde Shoal, about 15 miles from the entrance. Our troubles commenced here; for the first day out we grounded and remained fixed for three or four hours. The chart we found worse than useless, for the channels are so much altered since the survey was made that it is impossible to pilot by it. Sunday the 7th the Cruiser made her appearance, and after we had piloted her beyond the Blonde, left her to pursue her way, thinking the chart was a sufficient guide. She grounded, however, about 2 miles s. by w. of Harvey Point, and when the Dove went to her assistance she grounded likewise, both vessels when the tide fell being This position is where there were 9 fathoms when the chart high and dry. was made—the bank stretching about a mile and a half n.w. and s.E. of us, all deep water according to the plan. After this we were prepared for anything, and merely used the chart for its geographical information: as for hydrography, we were obliged to find the channels as we went, and where the chart was right it was only chance, the bed of the river is so much altered. The tide during the night did not rise high enough to float us, and at low water we walked from ship to ship on the bank, and got equal altitudes, played quoits, &c., on it. Monday, 8th, in the forenoon both vessels floated, and Dove proceeded to join the rest of the squadron, which were then leaving Wusung. Lord Elgin and his suite in the *Furious*, *Retribution*, and *Lee* gun-boat. They were in and his suite in the Furious, Retribution, and Lee gun-boat. They were in such a hurry in the Furious that they could not stop a while to get the position of Cruiser bank. "More haste less speed," for she grounded on the very bank Cruiser and Dove had discovered, and delayed us nearly two days getting her off. Thursday, 11th November, we proceeded, and at noon were brought up again off Fushan, 50 miles from Wusung. We had taken the channel along the south shore (right bank of river), and carried deep water till abreast of Fushan Hill; here it commenced to shoal, and the large ships anchored, while the Dove and Lee were employed searching for the channel. We crossed over to the left (north) bank under Langshan Hills and found a broad deep channel there; but how to connect it with the southern side was the difficulty. When the chart was made, the channel to cross in, though intricate, was deep; now, however, all our efforts were in vain—the greatest depth we could anywhere find being only 2 fathoms at low water; in 1854 we find the Styx crossed in 3 Friday, 12th, searching all day, but without success. fathoms at low water. Saturday, 13th, doing the same, and about 3 P.M. succeeded; Dove working along the southern channel in shoal water, and boats in the northern channel, each trying to approach the other in deep water: this happened off Plover Point, about 12 miles east of Fushan on the same side of the river. Sunday, 14th, the large ships had to retrace their steps to Plover Point, and led by the gun-boats proceeded up the northern channel in 6 to 10 fathoms, where according to the chart there is shoal water with several dry patches! This will give you an idea of the changes that have taken place, and here is by far the most intricate part of the navigation of the river: it took us six days advancing 50 After passing Langshan the river narrows considerably, and though there are sand banks and shoals in it which are unmarked in the plan, yet by keeping mid channel we generally kept in deep water, and had no stoppage until arriving at Silver Island.

I am afraid you will find my letter very uninteresting thus far, so much about fathoms and shoals, &c.; but I think it would be incomplete if omitted,

and as you will probably remember the localities, it may interest you a little to compare the changes that have taken place since you were in the Yang-tze,

in the memorable expedition to Nanking, 1841.

Tuesday, 16th November.—At Silver Island. Furious, with Cruiser in tow, leading; and Retribution, with Dove and Lee in tow (repairing their boilers), following. All under sail and going at utmost speed. No indication of danger either in the appearance of the place or on the chart, yet to the surprise of all the Furious struck suddenly on a rock, heeled over 10 degrees, and remained immoveable; fortunately there were no collisions among the others, for the moment it was observed the Retribution stopped and went astern full speed, with ourselves and the Lee close to her; how we managed to keep clear is a mystery; we both had our fires out, and entirely under control of the Retribution.

On sounding near the Furious we found she was on a bed of boulder rocks 2 to 2½ fathoms, stretching across the channel 200 yards from the w. extreme of the island; and from the opposite side sunken rocks extend, so as to narrow the deep water to less than 100 yards, yet strange to say the whole of Sir William Parker's fleet passed through, and no accident that we are aware of happened. The Furious remained on the rocks three days; she had to be lightened of all her coal, provisions, guns, and water; in the meanwhile the Dove was employed making a small plan of the locality and examining the channel on the north side of Silver Island. There was plenty of water in that, but the passage to the eastward, Silver Island, will no doubt be connected in a few years with the low bank of the river east of it, for since 1842 a grass flat of 300 yards length has grown up, and where the chart gives 10 and 12 fathoms, we could find barely 33. The country around Silver Island is very pretty and diversified, but a wilder scene of desolation and ruin than the city of Chinkiang and the villages near it present, it would be impossible to conceive. All this has arisen from civil war: in flourishing times this part of the Yang-tze, where the Grand Canal flows into it, is said to be crowded with junks and boats freighted with the wealth of Northern and Central China; but at the present time scarce a boat of any description is to be seen, except the Imperial war junks blockading the approaches to Nanking. Chinkiang (where we had a smart conflict with the Tartar troops last war) is now in the hands of Imperialist soldiers, the inhabitants have nearly all fled, and there seems scarcely a sound house in it. The mandarins of this place were very civil indeed, offering to send supplies, &c., to any who were in want; but we were uncharitable enough to think they were civil only with the deeper design of mixing us up in their cause against the rebels: for when, after the Furious was all right again, we proceeded towards Nankin, they despatched their war steamer (a small screw vessel, 300 or 400 tons) to follow us, and as the whole squadron approached Nankin, this vessel kept close in the rear, looking very much as if she were one of us.

We left Chinkiang on the morning of the 20th of November, and about five in the evening came abreast of Nankin. The Lee had been sent ahead of the squadron to communicate with the rebels in case they made the first advances, and we thought she had passed all the forts unmolested, when three guns were fired from them. We are under the impression that these were not shotted guns. The Lee, however, says they were; at all events no shots were seen to fall in the river; the fourth gun was unmistakeably shotted, and the next, as if to relieve us of any lingering doubts, struck the Dove on her portbeam, just at the water line, and sent a shower of spray on board; in much less time than it takes me to write this, the answer was returned, Dove firing the first gun. The larger ships were more than half a mile astern at this time, out of range of the enemy's guns; the Lee had passed them; so that for about five minutes the Dove was receiving the whole of the fire; fortunately, however,

we were small, and moving rapidly, so the shot flew over our heads and astern, though quite close enough to be unpleasant; one struck us on the quarter, but did no damage. The moment Retribution could bring her broadside to bear, the forts on either bank got it very warm, though they still continued to fire briskly. The Retribution was struck about twenty times in her hull, and twice in both funnels; almost the first three shots she received killed a marine, carried off the arm of a young midshipman, and the leg of the signalman: these were the only casualties. Furious was struck several times; two shots lodged in Lord Elgin's cabin, and a third shattered his barge at the quarter davits. Cruiser, sternmost ship, had only one or two shots fired at her: the forts were silenced before she came up. We anchored in the evening about 2 miles above the city, and the next morning (Sunday, 21 November) dropped down quietly towards the forts and opened fire at daylight. There is no doubt that they had had quite enough of it already, for only five or six shots were fired by them: one of these struck the Dove, and passed between the arm and side of one of the men without doing any harm; rockets and shell were fired into the city, and the forts and guns crippled. The bombardment lasted an hour and a half, after which we pursued our way up the river. As soon as we left, the Imperial fleet was seen to get under weigh and commence firing on the rebels; but they kept at too great a distance to do any harm. The rebels, though sadly mauled by us, were even then a match for any Imperial force. The latter are much afraid of them, and almost invariably lose in the engagements; the rebels are by far the best soldiers. Nankin has been invested these last four years, and the only hope the Imperialists have of capturing it is by starving the rebels out. The celebrated porcelain tower is no longer in existence : it was destroyed by the Tartars rather than the rebels should make a fortress of it.

About 25 miles above Nanking we were again fired at from some stupid little forts on the beach; but the Furious and Retribution gave them such an answer that the fellows ran off as hard as their legs would carry them: the officer in command, who was on horseback, was so dreadfully frightened, and his horse too, that he dismounted, threw off all superfluous trappings, and joined the retreat on foot. Sunday evening our anchorage was near Tai-Ping, a large rebel city on the right bank, about 40 miles above Nankin. This looked strongly fortified. The chief came to Lord Elgin and told us that he had heard of the Nankin business, which was no doubt a mistake, and promised us messages should be sent to the various places in their hands along the river, and that we should not be fired at again.

10 miles above Tai-Ping we had a delay of 24 hours, caused by the Retribution grounding, and on the 23rd November anchored off the rebel city of Woohoo. The people of it were very civil, and there was some intention of leaving the Retribution here; but learning from an Imperial fleet a few miles beyond, that at Kieu-hien, 20 miles from Woohoo, fresh supplies could be had, it was decided the Retribution should be left there. The conversation that passed between the interpreter and the commodore of the Imperial fleet near Woohoo was somewhat amusing: he said he intended shortly to attack that city, and if the Retribution were left there it would be rather awkward if she were damaged in the engagement. While this conversation was being carried on in the cabin, we on deck were employed interrogating one of the commodore's crew, who unhesitatingly told us that this very fleet had been three years above Woohoo, and dared not run the gauntlet past it, or as he in Canton English expressed it, "have been three years top side, no can get down." So much for the old commodore's attack.

Wednesday, 24th November, the Retribution was left at the Imperial city of Kew-hsien, and the rest of the squadron proceeded. The next day while we were steaming full speed close to the left bank of the river, an animal was

observed swimming across to the off shore; the Dove chased it, and lowering a boat succeeded in capturing a wild boar; the prize weighed 150 lbs., and was soon disposed of. Anchored for the night off Chee-chow, and at noon of the 26th, Friday, came up to the city of Ganking, 150 miles from Nanking and about 330 miles from Wusung. *Furious* was headmost ship, and as soon as she came abreast of the Pagoda, the fort which encircles it opened fire. We were somewhat unprepared for this, after what the rebels had told us at Taiping and Woohoo. The signal to engage was soon made, and this pagoda and fort were so warmly replied to, that the inmates had to fly out to the rear for shelter. Our shot went through the pagoda and did very little damage beyond making a hole in it; but the shells sent parts of it into the air, and before the affair was over the front face of the fort was knocked down. When the rebels ran out the Imperialists attempted to take it; but rather than this should happen the former ran back again to suffer by our fire. The city stands on the left bank close to the water's edge, and the only channel is along the face of it. less than 100 yards from the walls. The squadron steamed slowly along it ready to fire only if fired upon first, and just as we were thinking of retreating from quarters and commenced to go on full speed, some foolish fellow, more daring than discreet, fired a paltry gingal at us. The exact spot it was fired from was noticed, and in about two or three minutes it was in ruins. This prolonged the engagement half an hour, and taking advantage of the confusion the Imperialist besiegers on the heights in the rear of the city commenced doing a little on their own account. They must have been disagreeably surprised, however, to get an occasional shot and shell from us. I noticed both Cruiser and Lee firing at them. Ganking is the last rebel city on the banks of the river, and is the worst situated of any of them: they are entirely cut off from any communication with others, and are believed to be suffering a great deal from hunger. The Imperialists are confident of taking it when the winter is in its rigour, and as neither give or take quarter, we may expect soon to hear of the horrible tragedy.

Leaving Ganking at 1 P.M., anchored for the night off the town of Soong-lew on the right bank, and the next day, Saturday, 27th November, the Furious grounded on a bed of rocks in the centre of the river: this delayed us twenty-four hours. Sunday, 28th, passed the Little Orphan, a remarkable rock on the left bank of the river, about 30 miles below the Poyang Lake. It rises precipitously 250 feet, has a pretty little pagoda on the top, and a handsome joss house or temple about half way up the face. Rising from the low flat bank it stands out a most remarkable object. Opposite to it on the right bank bold craggy cliffs 300 feet high fall close to the water's edge, the river flowing between them and the Little Orphan, being only 400 or 500 yards broad. As we passed through, the wind was blowing a fresh N.E. gale, with a thick mist, and the scene in consequence looking a very wild one. In the Dove we were rolling an occasional sea right over all, so that you will see the Yang-tze

is not always calm, even at this distance from the sea, 400 miles.

Monday, 29th November.—Near the entrance to the Poyang Lake the channels were very intricate, and after a delay of twenty-four hours the Furious just managed to get over, stopped a few hours at the Imperial city of Kew-Kiang, and had an opportunity of seeing what it was like. A graver imposture it would be difficult to conceive. The walls, which look most formidable from without, and covered with banners, enclose an area of 2½ or 3 miles, yet there are certainly not more than 300 houses in it, and of these not one-fifth part are sound. The banners seem to have been planted there for years, and a few wretched looking tents are scattered along the parapet, but soldiers there were none. A rusty old gingal was the only gun seen. This, like all the other cities which the rebels have had possession of, is mostly in ruins, and the inhabitants living in a crowded and piggish state. 10 miles

above Kew-Kiang we had to cross a 3 fathom bar, and even this depth was found with difficulty. A few miles farther we came to the only really pretty spot on the banks of the river. The hills fall steep to the water on both banks, and the valleys between are highly and extensively cultivated. This lasts for about 10 miles, when the same monotonous features, low flat banks and occa-

sional ranges of hills, extend all the way to Wuchang and Han-kow.

Friday, 3rd December.—Brought up by a bar, the greatest depth over it only 16 feet, a few inches more than the Furious drew. This was about 40 miles from Foochang, near the city of Hwang-Chow. The Dove preceded the squadron, with orders to return only if any more obstacles presented, in which case the Furious was to be left at Hwang-Chow. We were successful in carrying deep water all the way, and on Sunday, the 5th December, anchored at Han-kow, the long desired place of our destination, and the voyage to which from Wusung we had been thirty-five days accomplishing. Unfortunately it rained when we arrived, yet notwithstanding this, the crowd of wondering Chinamen who came to greet us was beyond all description. They pressed round us in boats, which were stowed so thickly that without any exaggeration we could have walked from the ship to the shore on them, a distance of 200 yards. No European vessel had ever before been seen there, and the puffing and hum of the gun-boat under weigh frightened them. We landed for a little while in the afternoon, and were not a little inconvenienced by the enormous crowd that pressed round us. Our clothes and arms were most minutely examined, and exclamations of "Heivah!" were delivered by thousands. The Furious, Cruiser, and Lee arrived the next day, Monday 6th; and though they were of course objects of great curiosity, yet there was no such wonder manifested when they made their appearance as had been shown the previous day when the Dove arrived. We were the first Europeans that dropped anchor at Han-kow.

For a description of Han-kow I must refer you to the paper: the writer of that had far better opportunities than I had of gathering information. You will see there are three names mentioned in connection with this place, Woochang, Han-yang, and Han-kow. The first of these is the provincial capital of Hoonan, and is a large fortified city on the right bank of the river. Hanyang is a small city on the left bank opposite Woochang, and Han-kow is the commercial town adjoining it. Before the rebels were here the latter was the largest commercial city of the Chinese Empire; and considering that it is but a short time since it was nearly destroyed, it shows unmistakeable signs of being again a very wealthy city. This is the port mentioned in Lord Elgin's treaty, between which and the sea the Yang-tze-Kiang is to be opened to European commerce. You will see the whereabouts of all these places on the little map

enclosed.

Sunday, 12th December.—We left Han-kow, and after a series of difficulties surmounted by the Furious and Cruiser, the whole of us arrived at Kew Kiang on the 20th, nine days accomplishing 120 miles. Moving on from day to day on our voyage up, no one appears to have thought of the possibility of the river falling; but during our stay at Han-kow several remarked it from the difficulty attending landing in places that at first were easy. This became a serious difficulty when the descent commenced. At Hwang Chow, 40 miles from Han-kow, a channel of 15 feet, just broad enough for the Cruiser and Furious to steam full speed through, was discovered; and at the 3 fathom bar on passing up, 10 miles above Kew Kiang, the Furious was bumped over 13 feet. Near the entrance to the Poyang Lake, however, the water had fallen since the 29th November 7 feet, leaving only 11 feet on the bar: over this it was impossible to get either Furious or Cruiser, and after having sounded and searched every part of the channel in the hopes of getting even a gutter with sufficient water to float them, it was resolved that the gun-boat should

proceed down the river and leave the Furious and Cruiser off Kew Kiang to remain there until the river rose (about April, 1859). Lord Elgin and his suite in the Lee and Dove, with twelve passengers, left Kew Kiang on Christmas Eve, arrived off Ganking the next evening, and the following morning passed without molestation the walls of that city. You will see by the paper what the rebels said of the affair in passing up, and we were not at all sorry to pass without blows. Had there been any firing, however, all we could have done would have been to fire our broadsides, and steam as fast as possible till out of reach of their guns. Our guns in the Dove, four 24-pounder brass howitzers, and a long 32-pounder, were all pointing at the city as we passed, loaded and primed; had the rebels fired, they would have soon been replied to. Came up with the Retribution at Woohoo on the evening of the 27th, and on the 29th the three vessels passed Nankin. The rebels were communicated with, and expressed sorrow at what had happened: they had evidently had enough of British warfare. All the forts were repaired, and seemed to be in better order even than when we passed up. Snow covered the hills, and occasionally showered down fresh supplies. Winter had set in in reality, and with it had disappeared from the heights the Imperialist army.

30th December.—Passed Silver Island, and anchored for the night about 25 miles below it. As it was expected there would be some delay in bringing the Retribution across the Langshan Crossing and beyond the Blonde Shoal, Lord Elgin decided in going on to Shanghae in the Lee, and leaving the Dove to assist in piloting the Retribution. His Lordship was very anxious to get down as soon as possible, and that there might be no delay, he wished Captain Ward to send one of the assistant surveyors to pilot the Lee down. I was selected, and we arrived at Shanghae about three days before the other ships. As had been anticipated, Langshan Crossing caused delay, "for during our absence up the river, the banks had altered so much that the little plan we made was of very little use; and the Retribution was brought over a patch of 3 and 31 fathoms, where in searching for the channel in going up we had only 6 and 9 feet. So much for charting the Yang-tze-Kiang: it will never be expeditiously or safely navigated until there are local pilots distributed along the banks. To be thoroughly acquainted with the whole of it is next to impossible, for every 50 or 80 miles there must be a pilot, and he will have enough to do between the delays of piloting ships to make himself acquainted with the changes that have taken place. The most difficult part is from Wusung to Langshan, and of course in the summer season, when the downward stream is at its greatest velocity, there will need careful men to handle ships higher up the river. Steamers of light draught will no doubt be the principal vessels employed."

The Lee arrived at Shanghae on New Year's-day, and great was the astonishment of the Shanghae folks to see his Lordship's flag at the main of a gun-boat: he landed amidst the saluting of English, French, and Russian men-of-war.

So ended the expedition up the great river of Yang-tze-Kiang. It has certainly been a most eventful and interesting one, but rather too long: had there been less delay in going up, it was intended to take the squadron into the large lake Toong-ting, about 100 miles above Han-kow; but all had begun to feel anxious to return when we arrived there, besides which the river falling warned us of the difficulty in returning, and every day's delay made it worse.

As soon as the news of the Furious and Cruiser being shut up in the river was made known, all haste was made in shipping provisions on board the Nimrod and Opossum, Lee and Dove, gun-boats, and the Dove got away on Saturday, 8th January, her decks crowded with stores and provisions and clothing, for both the vessels were hard up for almost everything. It was Captain Ward's intention to hurry on with all despatch, and getting rates for

chronometers at Kew Kiang, return again for a good meridian distance. Imagine our surprise therefore to see the Dove return at daylight on Monday with the gratifying news that the Furious and Cruiser were both approaching Wusung, having succeeded in just scraping over the bar near Poyang Lake. After we left them on Christmas Eve, rain fell in torrents for five or six days, and watching very carefully the marks they had painted on the rocks, they discovered the water rising. Losing not a moment, they got under weigh and proceeded to the bar, and the very minute there was sufficient water, crossed over. It was well they were so expeditious, for during the night the rain ceased, and a sharp frost setting in, the river fell in a few hours lower even than before. This is a most happy completion of all their labours. The prospect of a winter in the heart of China, ravaged as the country is by civil war, was by no means a cheering one; and, however much the Shanghae merchants regret the vessels' arrival here, as they say the gun-boats going up and down would have kept the navigation of the river open, yet to those on board the change is decidedly for the better. Kew Kiang for Shanghae miserable, woe begone Chinamen for the cheering faces of their own countrymen.

While we have been in the Yang-tze, Hooper, Kerr, Ellis, and Farmer have completed the survey of the Wusung, from the entrance to 3 miles above Shanghae. There is a chart of it already, but the changes that have taken place since that was made require a resurveying of the river. To chart the Yang-tze in our late cruise was the principal object of our accompanying the expedition. All we could do, however, was to project by course and patent log, and to get observations whenever practicable. Our starting point was from San Shan Point, 12 or 13 miles above Nankin, and the last point in Collinson's survey. We measured a base by patent log, and carried on a running survey for about 80 miles; but here the hills left us for a considerable distance, and the points were lost. After this by patent log was all we attempted. From before daylight, when we had to plot courses by the light of a lantern, till dark in the evening, either Lieutenant Bullock or myself was on deck, sketching and plotting as we went. We had to keep our eyes about us, and were not at all sorry when each day's work was over. To me it was quite a new feature in surveying, collecting data and plotting it, going 5 to 7 knots an hour.

VII.—On a New Projection of the Sphere. By Sir J. F. W. HERSCHEL, Bart., K.H., D.C.L., F.R.S., &c. &c.

Communicated by Sir R. I. MURCHISON, Pres. R.G.S., &c. &c.

Read, April 11, 1859.

Investigation of the conditions under which a spherical surface can be projected on a plane, so that the representation of any small portion of the surface shall be similar in form to the original.

Let x, y, be the longitude and latitude respectively of any point on the surface of the sphere whose radius is unity, and let u, z, be the rectangular co-ordinates of the projection of that point on a plane, so that when x and y are determined, u and z will be so also, or, in other words, so that u and z shall be functions (indeterminate for the present) of x and y, either singly or both